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New Claims

5 1. A circuit arrangement for the dynamic control of piezo-
translators (2) with energy recovery by means of a single
inductive intermediate store (1) which is arranged in series
with the piezotranslators (2) as well as by clocked switches,
wherein
characterised in that

10 for achieving a predetermined linear voltage characteristic at
the piezotranslator (2), the secondary circuit is designed as
a half-bridge consisting of the switches (3, 4) at whose
output the inductive intermediate store (1) is arranged in
series with the piezotranslator (2), with the switches (3, 4)
15 being externally controlled and operated at a high cycle or
switching frequency in such a manner that the intermediate
store is alternately connected with an upper or lower supply
voltage ($UB/2$) at the most, with the series connection of
piezotranslator (2) and inductive intermediate store (1)
20 carrying a superimposed bridge direct current.

2. The circuit arrangement according to Claim 1,
wherein
characterised in that

25 the switches (3, 4) are formed as MOS transistors (9), with an
external diode (10) being connected in series with the clear-
ance between contacts, and this series connection being
bridged by a commutating diode (11) which is oppositely poled
to the diode (10).

30 3. The circuit arrangement according to ^{Claim 1} ~~one of the previous~~
~~claims,~~
wherein
characterised in that

35 a current sensor (12) for generating a control voltage which
is proportional to the output current of the final stage (18)
is arranged in the secondary circuit of the piezotranslator

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(2) for controlling the arrangement, with the control voltage being connected with a first input of a first controller (13), the second input of the first controller (13) being applied at the output of the second controller (14), at whose two inputs a predetermined reference variable according to the physical position of the piezotranslator (2) and an actual value which is proportional to the output voltage of the final stage (18) are applied.

10 4. The circuit arrangement according to Claim 3,
~~characterised in that~~
^{wherein}

15 a third controller (19) is provided for the positioning control, at whose first input the reference variable of the physical position of the piezotranslator (2) and at whose second input a mechanical actual value which is detected via a sensor (20) of the piezotranslator (2) are applied, with the output of the third controller (19) being connected with one of the inputs of the second controller (14).

20 5. The circuit arrangement according to Claim 3,
~~characterised in that~~
^{wherein}

25 the second controller (14) feeds back the integral of the piezotranslator current in lieu of a voltage which is proportional to the output voltage of the final stage (18).

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Claims

1. A circuit arrangement for the dynamic control of ceramic
5 solid-state actuators, such as piezotranslators with energy
recovery by means of magnetic intermediate stores and/or stor-
age capacitors as well as by clocked switches,
characterised in that
for achieving a predetermined linear voltage characteristic at
10 the piezotranslator (2), a single inductive intermediate store
(1) is arranged in the secondary circuit, which is connected
in series with the piezotranslator (2) and the secondary cir-
cuit is designed as a half-bridge, with the switches (3, 4)
15 provided in the respective half-bridge being externally con-
trolled and operated at a high cycle or switching frequency,
and with the series connection of piezotranslator (2) and in-
ductive intermediate store (1) furthermore carrying a super-
imposed bridge direct current.
- 20 2. The circuit arrangement according to Claim 1,
characterised in that
the switches (3, 4) are formed as MOS transistors (9), with an
external blocking diode (10) being connected in series with
the clearance between contacts, and this series connection
25 being bridged by a commutating diode (11) which is oppositely
poled to the blocking diode (10).
3. The circuit arrangement according to Claim 1 or 2,
characterised in that,
30 under installation aspects, the intermediate store (1) is
arranged close to the piezotranslator (2).
4. The circuit arrangement according to one of the previous
claims,
35 characterised in that

a current sensor (12) for determining a control voltage which is proportional to the output current of the final stage (18) is arranged in the secondary circuit of the piezotranslator (2) for controlling the arrangement, with the control voltage being connected with a first input of a first controller (13), the second input of the first controller (13) being applied at the output of the second controller (14), at whose two inputs a predetermined reference variable according to the physical position of the piezotranslator (2) and an actual value which is proportional to the output voltage of the final stage (18) are applied.

5. The circuit arrangement according to Claim 4, characterised in that

a third controller (19) is provided for the positioning control, at whose first input the reference variable of the physical position of the piezotranslator (2) and at whose second input a mechanical actual value which is detected via a sensor (20) of the piezotranslator (2) are applied, with the output of the third controller (19) being connected with one of the inputs of the second controller (14).

6. The circuit arrangement according to Claim 4, characterised in that

the second controller (14) feeds back the integral of the piezotranslator current in lieu of a voltage which is proportional to the output voltage of the final stage (18) in order to improve the dynamic behaviour of the control.